

### Avian Inventory & Monitoring Protocols – Passerines

One time use of any of these levels is inventory; monitoring requires multi-time use.

Survey Level	Questions	Methods	Products
<b>Preliminary</b> (office-oriented)	<ul style="list-style-type: none"> <li>• Is taxon present or absent?</li> <li>• What species are potentially present in unit?</li> <li>• For what species does suitable habitat exist in the unit?</li> </ul>	<ul style="list-style-type: none"> <li>• Literature search for information on species life history, range, habitat requirements, etc. <b>(3,4,12,13)</b></li> <li>• Check species lists compiled by others for area (Audubon Society, Breeding Bird Atlas, Christmas Bird Counts, local bird clubs, universities, and other government and non-government entities) <b>(14,15)</b></li> <li>• Check CNDDDB RareFind for Special Concern, T &amp; E species occurrences in quads in and near park <b>(5)</b></li> <li>• Run CWHR model for area to get list of potential species present <b>(6)</b></li> <li>• Check CalParks Fauna database for list of species present in park <b>(10)</b></li> </ul>	<ul style="list-style-type: none"> <li>• Preliminary list of potential species present</li> <li>• List of potential Special Concern, T &amp; E species</li> </ul>
<b>Reconnaissance</b> (field-oriented)	<ul style="list-style-type: none"> <li>• Is taxon present or absent?</li> <li>What is the species               <ul style="list-style-type: none"> <li>• Distribution?</li> <li>• Composition?</li> <li>• Relative abundance?</li> <li>• What is the habitat condition?</li> <li>• What are the habitat associations/relationships?</li> <li>• Are there any obvious threats to the species/habitat?</li> <li>• Monitoring: Is there a change in any of the above?</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Diurnal area searches with associated habitat descriptions: 20-minute timed area-constrained searches in each habitat type, recording every bird seen and/or heard. Repeat at least 3 times in breeding season. <b>(1,2,9,13)</b></li> </ul>	<ul style="list-style-type: none"> <li>• Presence/absence information</li> <li>• Preliminary species lists, or richness</li> <li>• Course information on habitat condition and habitat associations for different habitats (plant communities) on site</li> <li>• Preliminary indication of potential threats/management concerns</li> <li>• Indication of large-scale change (monitoring)</li> </ul>
<b>Baseline</b> (field-oriented)	<p>Same as above, plus:</p> <ul style="list-style-type: none"> <li>What is the species               <ul style="list-style-type: none"> <li>• Frequency?</li> <li>• Density?</li> <li>• Richness?</li> <li>• Productivity?</li> <li>• Survivorship?</li> <li>• What birds are breeding in this unit/area?</li> <li>• Where are birds nesting in this unit/area?</li> <li>• Are birds breeding successfully?</li> <li>• Have young fledged successfully? If not, may be an indication of nest depredation, etc. (nest searching and monitoring)</li> <li>• Is the species impacted by predation and/or parasitism?</li> <li>• Monitoring: Is there a change in any of the above?</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Methods outlined in the Prelim. &amp; Recon. Levels plus:</li> <li>• Extensive point counts through each habitat type found in area (5-minute point counts, min. of 250 meters apart along a transect such as a road or trail through park), with associated (releve) vegetation survey to characterize habitat at each point. (For a point count, the observer(s) stands at a fixed point, the center of a 50 meter radius circle, and records every bird seen or heard for five minutes.) <b>(1,2,8,9)</b></li> <li>• Spot mapping (time consuming): 10 visits of 5 hours each in a breeding season. Observe bird behavior and record movements on a detailed 1:2000 map of the area, and end up with maps of territories which can give you bird density. Time needed for map preparation at start of season. <b>(1,2)</b></li> <li>• Nest searching and monitoring for a single breeding season (time consuming): Once locations are determined by observing bird behavior every few days, each nest is monitored by checking every 3 to 4 days. <b>(1,2,4)</b></li> <li>• For all methods, GPS and map all plots, transects,</li> </ul>	<ul style="list-style-type: none"> <li>• General species lists and habitat associations (point counts)</li> <li>• Preliminary indication of species density; what species are most common in area/different habitats (point counts, spot mapping)</li> <li>• Baseline information that can be used in following years to monitor population changes</li> <li>• Indication of change in numbers of individuals</li> <li>• Preliminary information on demographics: reproductive success, recruitment, etc. (nest searching)</li> <li>• Information on predation/parasitism (nest searching)</li> <li>• Maps of breeding territories (spot mapping)</li> <li>• Maps of nesting habitat and nest sites (nest searching)</li> </ul>

### Avian Inventory & Monitoring Protocols – Passerines

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Survey Level	Questions	Methods	Products
		stations, etc.	
<b>Comprehensive</b> (field-oriented)	<p>Same as above, plus:</p> <ul style="list-style-type: none"> <li>• How healthy are the birds in the unit/area?</li> <li>• What are the species demographics (for example, are there small or large numbers of juveniles compared to adults)?</li> <li>• Same as above, but is the change statistically significant?</li> </ul>	<ul style="list-style-type: none"> <li>• Methods outlined in the Baseline Level (but more samples, in more areas) plus:</li> <li>• Mist netting and banding in representative habitat types. Netting requires experience, permit and certification! Run nets 4-6 hours, starting at sunrise. Check nets every 30-45 minutes. Operate nets 10-12 days during a breeding season. <b>(1,2,7)</b></li> <li>• Sample during all seasons (not just breeding season)</li> <li>• Depending on objectives, combine a number of methods in same study/monitoring program</li> </ul>	<ul style="list-style-type: none"> <li>• Products of the above levels plus:</li> <li>• Comprehensive species list for each major habitat type in park (species compositions, distributions, and habitat associations, or requirements). (area search, point counts)</li> <li>• Preliminary information on health and demographics of populations (mist netting, nest searching)</li> <li>• Same as Baseline, but data subjected to more statistically rigorous tests</li> <li>• Trend detection</li> <li>• Stronger indication of threats to taxon and management concern</li> </ul>
<b>Intensive</b> (field- & laboratory-oriented)	<p>Same as above, plus:</p> <ul style="list-style-type: none"> <li>• What are the demographics of the populations (more detailed information)?</li> <li>• What are the population dynamics?</li> <li>• What are the management impacts on taxon?</li> <li>• What are the visitor-use impacts?</li> <li>• Specific cause and effect questions.</li> </ul>	<p>For an intensive inventory, combinations of all methods including the ones listed in above levels, are recommended. For example combine point counts with mist netting, point counts with nest searching, or area search with mist netting, spot mapping with nest searching and monitoring, etc. Depends on parameters and objectives of intensive inventory. <b>(16)</b></p> <ul style="list-style-type: none"> <li>• Intensive point counts placed in a mist net or nest search plot. 9-16 points, in a grid 75-100 meters apart. <b>(1,9)</b></li> <li>• Mist netting and banding, with an array of 8-12 nets spaced out in a 5-10 ha plot, all run at same time. <b>(1,7)</b></li> <li>• “Rapid Ornithological Inventory:” Combination of mist netting, nocturnal surveys, and area search, over a period of three days, with two people</li> </ul>	<ul style="list-style-type: none"> <li>• A detailed collection of data for a specific site or area within a park (or for a small park), including species diversity and density (area search, point counts)</li> <li>• Maps of breeding territories (spot mapping)</li> <li>• Mapped locations of and statistics of nests (nest success, may get indication of reasons for nest failures). (nest searching and monitoring)</li> <li>• Statistically rigorous data about population, cause and effect</li> <li>• Detailed scientific reports that include management recommendations</li> </ul>

### Avian Inventory & Monitoring Protocols – Raptors

One time use of any of these levels is inventory; monitoring requires multi-time use.

Survey Level	Questions	Methods	Products
<b>Preliminary</b> (office-oriented)	<ul style="list-style-type: none"> <li>• Is taxon present or absent?</li> <li>• What species are potentially present in unit?</li> <li>• For what species does suitable habitat exist in the unit?</li> </ul>	<ul style="list-style-type: none"> <li>• Literature search for information on species life history, range, habitat requirements, etc. <b>(3,4,12,13,20)</b></li> <li>• Species lists compiled by others for area (Audubon Society, Breeding Bird Atlas, Christmas Bird Counts, local bird clubs, universities, Raptor Observatory migration counts) <b>(14,15)</b></li> <li>• Check CNDDDB RareFind database for Special Concern, T &amp; E raptor species occurrences in quads in and near park. <b>(5)</b></li> <li>• Run CWHR model for list of potential species present. <b>(6)</b></li> <li>• Check CalParks Fauna database for list of raptor species present in park <b>(10)</b></li> <li>• Map and aerial photo studies, looking for potentially suitable nesting habitat in park and nearby (cliffs, water bodies, woodlands, etc.). Record potential habitat areas on maps for future field surveys. <b>(20)</b></li> </ul>	<ul style="list-style-type: none"> <li>• Preliminary list of potential raptor species present</li> <li>• Information on presence and locations of suitable habitat</li> <li>• Map of potential raptor nesting habitat</li> <li>• List of potential Special Concern, T &amp; E raptor species.</li> </ul>
<b>Reconnaissance</b> (field-oriented)	<ul style="list-style-type: none"> <li>• Is taxon present or absent?</li> </ul> What is the species <ul style="list-style-type: none"> <li>• Distribution?</li> <li>• Density?</li> <li>• Composition?</li> <li>• Frequency?</li> <li>• Relative abundance?</li> <li>• What is the habitat condition?</li> <li>• What are the habitat associations/relationships?</li> <li>• Are there any obvious threats to the species/habitat?</li> <li>• Monitoring: Is there a change in any of the above?</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Road surveys/counts: Drive roads of park, looking for any raptors flying, perched on telephone poles, trees, etc. For each raptor occurrence, record weather conditions, habitat use, bird activity, and location on map. <b>(17,19,20,21)</b></li> <li>• Foot Surveys: (good as a supplement to road surveys) Walk systematic transects recording times birds are seen, age, sex, activity, direction of flight, and habitat use. <b>(17)</b></li> <li>• Diurnal broadcast surveys:</li> <li>• Nocturnal broadcast surveys for owls (10 minute survey at each station, playing 6 vocalizations equally spaced for 5 minutes, rotating the direction of calls around the compass, then listening for responses for 5 minutes) to detect presence of different species at stations in each potential habitat type. GPS and record environmental conditions at each survey station, and record directions and distances of responses to map locations of species (for follow-up day nest searches if desired). <b>(17)</b></li> </ul>	<ul style="list-style-type: none"> <li>• Presence/absence information (observation, road counts, broadcast surveys)</li> <li>• Habitat condition and habitat associations for different areas of site (road counts)</li> <li>• Preliminary raptor species list, indicating species richness (road counts, broadcast surveys)</li> <li>• Species distribution (road counts)</li> <li>• Preliminary indication of what owl and other nocturnal species may be present (broadcast surveys)</li> <li>• Indication of large-scale change</li> <li>• Preliminary indication of potential threats/management concerns</li> </ul>
<b>Baseline</b> (field-oriented)	Same as above, plus: <ul style="list-style-type: none"> <li>• Where are the species nesting, or potentially nesting?</li> <li>• Are there species nesting along rivers and lake shorelines (ospreys, bald eagles)?</li> </ul>	Methods outlined in Prelim. & Recon. Levels plus: <ul style="list-style-type: none"> <li>• Aerial surveys: Using helicopters, fixed-wing or ultralight aircraft, fly along systematically spaced straight-line routes, or along shoreline, cliff, or other habitat feature</li> </ul>	<ul style="list-style-type: none"> <li>• A general raptor species list and species distribution (all methods)</li> <li>• Baseline information on locations of territories, roost and nest sites. (foot surveys, float surveys)</li> </ul>

## Avian Inventory & Monitoring Protocols – Raptors

One time use of any of these levels is inventory; monitoring requires multi-time use.

Survey Level	Questions	Methods	Products
	<ul style="list-style-type: none"> <li>Species richness?</li> <li>Demographics?</li> <li>Productivity?</li> <li>Survivorship?</li> <li>Monitoring: Is there a change in any of the above?</li> </ul>	<p>where birds are expected to occur. Photograph, count and record observations including adults and young, plumage and bird activity, as well as marking locations on a map. <b>(17,19,20)</b></p> <ul style="list-style-type: none"> <li>Visit suitable nesting habitat and observe and record nests and species if present, In areas identified in above aerial photos and maps, visit the sites and look for nests and raptor activity, and GPS and map locations, species, etc. <b>(17?)</b></li> <li>Float (boat) surveys (for species that nest near water, i.e. osprey and bald eagle): Boat down river or along lakeshore looking in trees near water edge for nests of ospreys, bald eagles, etc. <b>(17,19,20)</b></li> <li>Roost counts: Record species and numbers of individuals at known roosts, check suitable roost areas. GPS locations. <b>(19,20?)</b></li> </ul>	<ul style="list-style-type: none"> <li>Information on what species are nesting in the unit/area</li> <li>Species Distribution (aerial surveys, float surveys)</li> <li>Indication of change in numbers of individuals for different species (roost counts)</li> <li>Preliminary information on demographics (reproductive success, recruitment, etc.)</li> <li>Information on predation/parasitism (from nest searching)</li> <li>Indication of nest success</li> </ul>
<b>Comprehensive</b> (field-oriented)	<p>Same as above, plus:</p> <ul style="list-style-type: none"> <li>How healthy are the birds in the unit/area (preliminary look)?</li> <li>What are the species demographics (preliminary look)?</li> <li>Monitoring: Same as above, but is the change statistically significant?</li> </ul>	<ul style="list-style-type: none"> <li>Same as above in Primary, with more comprehensive road counts, foot surveys, aerial surveys, and broadcast surveys</li> <li>GPS/map all territories and nests located.</li> </ul>	<ul style="list-style-type: none"> <li>Products of the above levels plus:</li> <li>Comprehensive species list for each major habitat type in park (species compositions, distributions, and habitat associations, or requirements). (area search, point counts)</li> <li>Maps of known occupied territories</li> <li>Preliminary data on population demographics.</li> <li>Same as Baseline, but data subjected to more statistically rigorous tests.</li> <li>Trend detection</li> <li>Stronger indication of threats to taxon and management concern</li> </ul>
<b>Intensive</b> (field- & laboratory-oriented)	<p>Same as above, plus:</p> <ul style="list-style-type: none"> <li>What birds are breeding in this unit/area?</li> <li>What are the demographics of the populations (for example, are there small or large numbers of juveniles compared to adults)?</li> <li>Are birds breeding successfully?</li> <li>Have young fledged successfully?</li> <li>What are the population dynamics?</li> <li>What are the management impacts on taxon?</li> <li>What are the visitor-use impacts?</li> <li>Specific cause and effect questions.</li> </ul>	<p>For an intensive inventory, combinations of these methods are recommended depending on parameters and objectives of intensive inventory/monitoring.</p> <ul style="list-style-type: none"> <li>Diurnal broadcast surveys</li> <li>Nocturnal broadcast surveys</li> <li>For owls, search occupied areas (found in Primary Inventory) for nests (look for pellets, inspect old woodpecker holes, and cavities, etc.) and inspect nests, counting young and recording condition of young. This can be done from a distance with a spotting scope, or right at the nest if necessary.</li> <li>Mist nets and banding in specific project area, areas of high activity, or along migration flyways (Netting and banding requires expertise and permit!).</li> <li>Inspect nests and band young (need expertise and banding permit): Check known nests, record numbers</li> </ul>	<ul style="list-style-type: none"> <li>A detailed collection of data for a specific site or area within a park (or for a small park), including species diversity and density (broadcast surveys, road and foot surveys, float surveys)</li> <li>Maps of breeding territories (broadcast surveys, foot surveys)</li> <li>Mapped locations of and statistics of nests (nest success, may get indication of reasons for nest failures). (nest searching and monitoring)</li> <li>Information on health and demographics of populations. (mist netting, nest searching)</li> <li>Statistically rigorous data about population, cause and effect.</li> <li>Detailed scientific reports that include management recommendations.</li> </ul>

### Avian Inventory & Monitoring Protocols – Raptors

One time use of any of these levels is inventory; monitoring requires multi-time use.

Survey Level	Questions	Methods	Products
		<p>and condition of young, band young. Be as quick as possible, to minimize stress to young and parents.?</p> <ul style="list-style-type: none"><li>• GPS nest sites and map occupied territories</li></ul>	



## Avian Inventory & Monitoring Protocols – Shorebirds

One time use of any of these levels is inventory; monitoring requires multi-time use.

Survey Level	Questions	Methods	Products
<b>Preliminary</b> (office-oriented)	<ul style="list-style-type: none"> <li>• What species are potentially present species in unit?</li> <li>• For what species does suitable habitat exist in the unit?</li> </ul>	<ul style="list-style-type: none"> <li>• Literature search for information on species life history, range, habitat requirements, etc. <b>(3,4,8,12,13)</b></li> <li>• Species lists compiled by others for area (International Shorebird Survey, Western Hemisphere Shorebird Reserve Network, Audubon Society, Breeding Bird Atlas, Christmas Bird Counts) <b>(14,15)</b></li> <li>• Check CNDDDB RareFind database for Special Concern, T &amp; E shorebird species occurrences in quads in and near park. <b>(5)</b></li> <li>• Run CWHR model for list of potential species present. <b>(6)</b></li> <li>• Check CalParks Fauna database for list of shorebird species present in park <b>(10)</b></li> <li>• Map and aerial photo studies, looking for potentially suitable shorebird nesting and roosting habitat in park and nearby (beaches, marshes, eucalyptus groves, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Preliminary potential species lists</li> <li>• Indication of presence of potential habitat</li> <li>• List of potential Species of Special Concern, T &amp; E and breeders</li> </ul>
<b>Reconnaissance</b> (field-oriented)	<ul style="list-style-type: none"> <li>• Is taxon present/not detected?</li> <li>• What is the species</li> <li>• Distribution?</li> <li>• Composition?</li> <li>• Relative abundance?</li> <li>• What is the habitat condition?</li> <li>• What are the habitat associations/relationships?</li> <li>• What birds are breeding in this unit/area?</li> <li>• Are there any obvious threats to the species/habitat?</li> <li>• Monitoring: Is there a change in any of the above?</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Diurnal area searches with associated habitat descriptions utilizing random ground transects at discrete sites. <b>(22,23)?</b></li> </ul>	<ul style="list-style-type: none"> <li>• Presence/absence information</li> <li>• Preliminary species lists</li> <li>• Indication of habitat condition and habitat associations for different communities.</li> <li>• Preliminary list of Species of Special Concern, T &amp; E and breeders.</li> <li>• Preliminary indication of large-scale change (monitoring)</li> <li>• Preliminary indication of potential threats/management concerns</li> </ul>
<b>Baseline</b> (field-oriented)	Same as above, plus: What is the species <ul style="list-style-type: none"> <li>• frequency?</li> <li>• density?</li> <li>• richness?</li> <li>• Monitoring: Is there a change in any of the above?</li> </ul>	<ul style="list-style-type: none"> <li>• Same as above levels, plus:</li> <li>• Greater number of diurnal area searches with associated habitat descriptions utilizing random ground transects at discrete sites. <b>(22,23)?</b></li> <li>• Staging area counts: Record species and numbers of individuals at known congregation/staging sites. GPS sites.</li> <li>• Nest searches and banding</li> <li>• Aerial surveys</li> <li>• GPS/Mapping of staging sites, nest sites and territories</li> </ul>	<ul style="list-style-type: none"> <li>• Species lists and habitat associations</li> <li>• Preliminary indication of which species are most common in different habitats</li> <li>• Baseline information on staging sites that can be utilized for monitoring purposes in future years</li> <li>• Indication of change in populations</li> <li>• Preliminary information on demographics (reproductive success, recruitment, etc.)</li> <li>• Information on predation/parasitism</li> <li>• Information on nesting success</li> </ul>
<b>Comprehensive</b> (field-oriented)	Same as above, plus: <ul style="list-style-type: none"> <li>• How healthy are the birds in this unit/area (preliminary look)?</li> </ul>	<ul style="list-style-type: none"> <li>• Same as above in Baseline.</li> <li>• Staging site surveys conducted every ten minutes commencing two hours prior to high tide.</li> </ul>	<ul style="list-style-type: none"> <li>• Comprehensive species lists for each major staging area (species compositions, distributions, and habitat associations)</li> </ul>

### Avian Inventory & Monitoring Protocols – Shorebirds

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Survey Level	Questions	Methods	Products
	<ul style="list-style-type: none"> <li>• What are the demographics of the populations (for example, are there small or large numbers of juveniles compared to adults)?</li> <li>• Monitoring: Is the change statistically significant?</li> </ul>	<ul style="list-style-type: none"> <li>• Aerial surveys: Fly over staging sites and photograph, count and record observations. <b>(22)</b></li> <li>• GPS all counted sites.</li> </ul>	<ul style="list-style-type: none"> <li>• Preliminary data on population demographics.</li> <li>• For monitoring, data subjected to more statistically rigorous tests</li> <li>• Trend detection</li> <li>• Stronger indication of threats to taxon and management concern</li> </ul>
<b>Intensive</b> (field- & laboratory-oriented)	<p>Same as above, plus:</p> <ul style="list-style-type: none"> <li>• Are birds breeding successfully?</li> <li>• Have young fledged successfully?</li> <li>• What are the population dynamics?</li> <li>• What are the management impacts on taxon?</li> <li>• What are the visitor-use impacts?</li> <li>• Specific cause and effect questions.</li> </ul>	<p>For an intensive inventory, combinations of these methods are recommended depending on parameters and objectives of intensive inventory/monitoring.</p> <ul style="list-style-type: none"> <li>• Large study sites should be divided into consistent sectors.</li> <li>• Each sector team should commence count at same time and monitor flock flight direction.</li> <li>• Survey route should be mapped.</li> <li>• Develop transects for detection of breeding individuals. GPS nest sites. <b>(22)</b></li> </ul>	<ul style="list-style-type: none"> <li>• Detailed collection of data for a specific species at a specific site:</li> <li>• Density</li> <li>• Habitat associations</li> <li>• Demographics</li> <li>• Nest success</li> <li>• Mapped territories</li> <li>• Nest sites</li> <li>• Statistically rigorous data about population, cause and effect</li> <li>• Detailed scientific reports that include management recommendations</li> </ul>



### Avian Inventory & Monitoring Protocols – Seabirds

One time use of any of these levels is inventory; monitoring requires multi-time use.

Survey Level	Questions	Methods	Products
<b>Preliminary</b> (office-oriented)	<ul style="list-style-type: none"> <li>• What species are potentially present in unit?</li> <li>• For what species does suitable habitat exist in the unit?</li> </ul>	<ul style="list-style-type: none"> <li>• Literature search for information on species life history, range, habitat requirements, etc. <b>(3,4,8,12,13)</b></li> <li>• Species lists compiled by others for area (BLM Monitors, Partners in Flight, Audubon Society, Breeding Bird Atlas, Christmas Bird Counts) <b>(14,15)</b></li> <li>• Check NDDDB RareFind database for Special Concern, T, &amp; E seabird species occurrences in quads in and near park. <b>(5)</b></li> <li>• Run WHR model for list of potential species present <b>(6)</b></li> <li>• Check CalParks Fauna database for list of seabird species present in park <b>(10)</b></li> <li>• Map and aerial photo studies, looking for potentially suitable nesting habitat in park and nearby (cliffs, islands, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>• Preliminary species lists</li> <li>• Indication of breeding habitat condition and habitat associations for different communities.</li> <li>• List of potential Species of Special Concern, T&amp;E and breeders</li> </ul>
<b>Reconnaissance</b> (field-oriented)	<ul style="list-style-type: none"> <li>• Is taxon present/not detected?</li> <li>• What is the species distribution?</li> <li>• What is the species relative abundance?</li> <li>• What is the habitat condition?</li> <li>• What are the habitat associations?</li> <li>• Composition?</li> <li>• Habitat relationships?</li> <li>• Are there any obvious threats to the species/habitat?</li> <li>• Monitoring: Is there a change in any of the above?</li> </ul>	<ul style="list-style-type: none"> <li>• Observation</li> <li>• Diurnal onshore visual sea searches during breeding season</li> <li>• Document observed nesting behavior</li> </ul>	<ul style="list-style-type: none"> <li>• Presence/absence information</li> <li>• Preliminary species lists</li> <li>• Indication of habitat condition and habitat associations for different communities.</li> <li>• Preliminary list of Species of Special Concern, T &amp; E and breeders.</li> <li>• Preliminary indication of large-scale change</li> <li>• Preliminary indication of potential threats/management concerns</li> </ul>
<b>Baseline</b> (field-oriented)	Same as above, plus: <ul style="list-style-type: none"> <li>• Where are the species nesting, or potentially nesting?</li> <li>• Are there species nesting along coastal or lake shorelines or on islands?</li> <li>• Density?</li> <li>• Demographics?</li> <li>• Productivity?</li> <li>• Monitoring: Is there a change in any of the above?</li> </ul>	<ul style="list-style-type: none"> <li>• Same as above in Prelim. &amp; Recon. Levels, plus:</li> <li>• Extensive early morning sea searches adjacent to nesting locales. <b>(24)</b></li> <li>• Aerial reconnaissance/photography.</li> <li>• GPS nesting sites.</li> <li>• Nest searches and counts</li> <li>• Adult counts</li> <li>• Fledged young counts and banding</li> <li>• GPS/Mapping of nest sites and territories</li> </ul>	<ul style="list-style-type: none"> <li>• General species lists and habitat associations</li> <li>• Breeding species lists and nesting habitat associations: baseline information that can be utilized for monitoring purposes in future years.</li> <li>• Indication of change in numbers of individuals</li> <li>• Preliminary information on demographics (reproductive success, recruitment, etc.)</li> <li>• Information on predation</li> </ul>
<b>Comprehensive</b> (field-oriented)	Same as above, plus: <ul style="list-style-type: none"> <li>• How healthy are the birds in the unit/area (preliminary look)?</li> <li>• What are the species demographics (preliminary look)?</li> <li>• Same as above, but is the change statistically significant?</li> </ul>	<ul style="list-style-type: none"> <li>• Same as above in Baseline. For monitoring, more samples over longer period of time.</li> <li>• Extensive early morning adult seabird counts adjacent to nesting locales. <b>(24)</b></li> <li>• Opportunistic visits to nesting colonies.</li> <li>• Aerial photography surveys (ground nesters only). Fly over nesting sites and photograph, count and record observations. <b>(24)</b></li> <li>• GPS and map all counted sites.</li> </ul>	<ul style="list-style-type: none"> <li>• Comprehensive seabird species list</li> <li>• Species compositions, distributions, and habitat associations</li> <li>• Maps of known occupied colonies</li> <li>• Preliminary data on population demographics.</li> <li>• For monitoring, same as Level II, but data subjected to more statistically rigorous tests.</li> <li>• Trend detection</li> <li>• Stronger indication of threats to taxon and management concern</li> </ul>

### Avian Inventory & Monitoring Protocols – Seabirds

One time use of any of these levels is inventory; monitoring requires multi-time use.

Survey Level	Questions	Methods	Products
<b>Intensive</b> (field- & laboratory-oriented)	Same as above, plus: <ul style="list-style-type: none"> <li>• What birds are breeding in this unit/area?</li> <li>• What are the demographics of the populations (for example, are there small or large numbers of juveniles compared to adults)?</li> <li>• Are birds breeding successfully?</li> <li>• Have young fledged successfully?</li> <li>• What are the population dynamics?</li> <li>• What are the management impacts on taxon?</li> <li>• What are the visitor-use impacts?</li> <li>• Specific cause and effect questions.</li> </ul>	For an intensive inventory, combinations of these methods are recommended depending on parameters and objectives of intensive inventory/monitoring. <ul style="list-style-type: none"> <li>• Same as above in Comprehensive</li> <li>• Active nest determination (ground nesters)</li> <li>• Fledged young documentation</li> <li>• Active burrow determination (looking for feathers, droppings, eggshell etc)</li> <li>• GPS nest sites.</li> </ul>	<ul style="list-style-type: none"> <li>• Detailed collection of data for a specific species at a specific site, including density.</li> <li>• Demographics</li> <li>• Nest sites.</li> <li>• Population dynamics</li> <li>• Mapped nesting colonies</li> <li>• Mapped foraging locales</li> <li>• Nest success</li> <li>• With monitoring, statistically rigorous data about population, cause and effect</li> <li>• Detailed scientific reports that include management recommendations</li> </ul>

## Avian Inventory & Monitoring Protocols – Rare Species

One time use of any of these levels is inventory; monitoring requires multi-time use.

Survey Level	Questions	Methods	Products
<b>Preliminary</b> (office-oriented)	<ul style="list-style-type: none"> <li>• What threatened, endangered, and species of special concern species are potentially present in the unit?</li> <li>• For what rare species is there suitable habitat in the unit?</li> </ul>	<ul style="list-style-type: none"> <li>• Check species lists compiled by others for area (Audubon Society, Breeding Bird Atlas, Christmas Bird Counts, local bird clubs, universities, and other government and non-government entities) <b>(14,15,25)</b></li> <li>• Check CNDDDB RareFind for Special Concern, T &amp; E species occurrences in quads in and near park <b>(5)</b></li> <li>• Run CWHR model for area for list of potential species present <b>(6)</b></li> <li>• Check CalParks Fauna database for rare species present in park <b>(10)</b></li> <li>• Check vegetation maps/aerial photos for presence of suitable habitat for target rare species and record potential areas for future site visits.</li> <li>• Consult with Fish and Game and U.S. Fish and Wildlife for known occurrences of rare species and potential habitat in park, request list of R,T, and E species in park and/or area.</li> </ul>	<ul style="list-style-type: none"> <li>• Preliminary indication of presence of rare species and/or suitable habitat</li> <li>• Habitat associations and requirements</li> </ul>
<b>Reconnaissance</b> (field-oriented)	<p>Same as above, plus:</p> <ul style="list-style-type: none"> <li>• Is taxon present or not detected?</li> <li>• Composition</li> <li>• Relative abundance?</li> <li>• Species distribution?</li> <li>• What is the habitat condition?</li> <li>• What are the habitat associations/relationships?</li> <li>• Are there any obvious threats to the species/habitat?</li> <li>• Monitoring: Is there a change in any of the above?</li> </ul>	<ul style="list-style-type: none"> <li>• Observation: Visit potentially suitable areas for target species (identified by above research).</li> <li>• Based on research and/or consultation with regulatory agencies and/or published reports for specific rare species under question, survey areas of known occurrence and/or suitable habitat with standard species-specific protocols recommended by regulatory agencies.</li> </ul>	<ul style="list-style-type: none"> <li>• Preliminary presence/absence information and species lists</li> <li>• Indication of habitat condition, and habitat associations for different areas (communities) of site</li> <li>• List of potential Special Concern, T &amp; E species.</li> <li>• Indication of large-scale change</li> <li>• Preliminary indication of potential threats/management concerns</li> </ul>
<b>Baseline</b> (field-oriented)	<p>Same as above, plus:</p> <p>What is the species</p> <ul style="list-style-type: none"> <li>• Frequency?</li> <li>• Density?</li> <li>• Richness?</li> <li>• Productivity?</li> <li>• Survivorship?</li> <li>• What rare birds are breeding in this unit/area?</li> <li>• Where are rare birds nesting in this area?</li> <li>• Is the species impacted by predation and/or parasitism?</li> <li>• Monitoring: Is there a change in any of the above?</li> </ul>	<ul style="list-style-type: none"> <li>• Methods outlined in the Preliminary Level plus:</li> <li>• Increase number of surveys from preliminary level (DFG and USFWS recommended protocols), and number of areas surveyed.</li> <li>• GPS/map survey points/transects, known populations, and areas of suitable habitat.</li> </ul>	<ul style="list-style-type: none"> <li>• Presence/absence information for target rare species</li> <li>• Distribution and habitat associations</li> <li>• Map of potential habitat and known locations of species</li> <li>• Indication of change in numbers of individuals</li> <li>• Preliminary information on demographics (reproductive success, recruitment, etc.)</li> <li>• Information on predation/parasitism</li> </ul>
<b>Comprehensive</b> (field-oriented)	<p>Same as above, plus:</p> <ul style="list-style-type: none"> <li>• How healthy are the birds in the unit/area</li> <li>• What are the species demographics (preliminary look)?</li> </ul>	<ul style="list-style-type: none"> <li>• Conduct more comprehensive, detailed studies, including potentially banding (based on regulatory agency recommended protocols)</li> <li>• GPS/map locations of rare species and their habitats</li> </ul>	<p>Products of the Preliminary Level plus:</p> <ul style="list-style-type: none"> <li>• Comprehensive list of rare species present</li> <li>• Distribution of target rare species</li> </ul>

### Avian Inventory & Monitoring Protocols – Rare Species

One time use of any of these levels is inventory; monitoring requires multi-time use.

Survey Level	Questions	Methods	Products
	<ul style="list-style-type: none"> <li>• Same as above, but is the change statistically significant?</li> </ul>		<ul style="list-style-type: none"> <li>• Comprehensive map of species locations</li> </ul>
<b>Intensive</b> (field- & laboratory-oriented)	Same as above, plus: <ul style="list-style-type: none"> <li>• What are the demographics of the populations (for example, are there small or large numbers of juveniles compared to adults)?</li> <li>• Are birds breeding successfully?</li> <li>• Have young fledged successfully? If not, may have an indication if nest was predated, etc. (nest searching and monitoring).</li> </ul>	<ul style="list-style-type: none"> <li>• According to DFG's and/or USFW's recommendations on protocols, conduct intensive species and/or site-specific surveys</li> <li>• GPS/ map species occupied sites, territories</li> <li>• Varies based on parameters and objectives of study.</li> </ul>	<ul style="list-style-type: none"> <li>• Detailed data on density and distribution of rare species, population dynamics and demographics, mapped locations and territories</li> </ul>

<b>Avian Inventory &amp; Monitoring Protocols – Exotic Species</b>			
One time use of any of these levels is inventory; monitoring requires multi-time use.			
Survey Level	Questions	Methods	Products
<b>Preliminary</b> (office-oriented)	<ul style="list-style-type: none"> <li>Is taxon present or absent?</li> <li>What species are potentially present in unit?</li> <li>For what species does suitable habitat exist in the unit?</li> <li>What are the habitat associations/ relationships?</li> </ul>	<ul style="list-style-type: none"> <li>Check species lists compiled by others for area (Audubon Society, Breeding Bird Atlas, Christmas Bird Counts, local bird clubs, universities, and other government and non-government entities) <b>(14,15)</b></li> <li>Run WHR model for area for list of potential species present <b>(6)</b></li> <li>Check NDDDB RareFind for Special Concern, T, &amp; E species occurrences in quads in and near park, for sensitive species that may be adversely affected by exotic species <b>(5)</b></li> <li>Consult with Fish and Game and U.S. Fish and Wildlife for known problem areas/populations of exotic species and potential habitat in park.</li> </ul>	<ul style="list-style-type: none"> <li>Preliminary indication of presence of exotic species and/or suitable habitat</li> <li>Indication of habitat associations and requirements</li> <li>List of potential Special Concern, T, &amp; E species that may potentially be adversely affected by exotic species</li> </ul>
<b>Reconnaissance</b> (field-oriented)	<p>Same as above, plus:</p> <ul style="list-style-type: none"> <li>Is taxon present or not detected?</li> <li>What is the species distribution?</li> <li>What is the habitat condition?</li> <li>What is the relative abundance?</li> <li>Composition?</li> <li>Habitat relationships?</li> <li>Is this exotic species posing any obvious threat to a native species?</li> <li>Monitoring: Is there a change in any of the above?</li> </ul>	<ul style="list-style-type: none"> <li>Observation: Visit potentially suitable areas for target exotic species (identified by above research).</li> <li>Diurnal area searches in conjunction with passerine inventory.</li> </ul>	<ul style="list-style-type: none"> <li>Preliminary presence/absence information</li> <li>Indication of habitat condition, and habitat associations for different areas (communities) of site</li> <li>Indication of large-scale change, especially increases in exotic species</li> <li>Preliminary indication of potential threats/management concerns, exotic species populations that may be impacting native species populations</li> </ul>
<b>Baseline</b> (field-oriented)	<p>Same as above, plus:</p> <p>What is the species</p> <ul style="list-style-type: none"> <li>Frequency?</li> <li>Density?</li> <li>Productivity?</li> <li>Survivorship?</li> <li>Is exotic species threatening any native species, for example by nest parasitism?</li> <li>Monitoring: Is there a change in any of the above?</li> </ul>	<ul style="list-style-type: none"> <li>Methods outlined in the Prelim. &amp; Recon. Levels, plus:</li> <li>Increase number of surveys from preliminary, and number of areas surveyed.</li> <li>Point counts in conjunction with passerine inventory.</li> <li>Incidental capture during passerine mist netting.</li> <li>Nest searches</li> <li>GPS/map survey points/transects, known populations, and areas of suitable habitat.</li> </ul>	<ul style="list-style-type: none"> <li>Presence/absence information for target exotic species, as well as density information</li> <li>Distribution and habitat associations</li> <li>Map of potential habitat and known locations of species</li> <li>Indication of change in numbers of individuals</li> <li>Preliminary information on demographics (reproductive success, recruitment, etc.)</li> <li>Preliminary information on predation/parasitism of native species.</li> </ul>
<b>Comprehensive</b> (field-oriented)	<p>Same as above, plus:</p> <ul style="list-style-type: none"> <li>Are the exotic species increasing and/or expanding their range?</li> <li>What are the species demographics?</li> <li>Is the change statistically significant?</li> </ul>	<ul style="list-style-type: none"> <li>Conduct more comprehensive, detailed studies, including potentially banding (based on regulatory agency recommended protocols)</li> <li>GPS/map locations of exotic species and their habitats</li> </ul>	<p>Products of the above levels plus:</p> <ul style="list-style-type: none"> <li>Comprehensive list of exotic species present</li> <li>Distribution and population trends of target exotic species</li> <li>Comprehensive map of exotic species locations</li> </ul>
<b>Intensive</b> (field- &	<p>Same as above, plus:</p> <ul style="list-style-type: none"> <li>What exotic birds are breeding in this unit/area?</li> </ul>	<ul style="list-style-type: none"> <li>According to DFG's and/or USFW's recommendations on protocols, conduct intensive species and/or site-</li> </ul>	<ul style="list-style-type: none"> <li>Detailed data on density and distribution of exotic species, population dynamics and demographics,</li> </ul>

### Avian Inventory & Monitoring Protocols – Exotic Species

One time use of any of these levels is inventory; monitoring requires multi-time use.

<b>Survey Level</b>	<b>Questions</b>	<b>Methods</b>	<b>Products</b>
laboratory-oriented)	<ul style="list-style-type: none"> <li>• Where are exotic birds nesting in this area?</li> <li>• Are birds breeding successfully?</li> <li>• Have young fledged successfully?</li> <li>• Is exotic species a nest parasite of native species and to what degree is it negatively impacting native bird species?</li> </ul>	<p style="margin-left: 20px;">specific surveys</p> <ul style="list-style-type: none"> <li>• Nest searches and banding of young</li> <li>• GPS/ map species occupied sites, nests, territories</li> <li>• Varies based on parameters and objectives of study.</li> </ul>	<p style="margin-left: 20px;">mapped locations and territories</p> <ul style="list-style-type: none"> <li>• With monitoring, statistically rigorous data about population, cause and effect</li> <li>• Detailed scientific reports that include management recommendations</li> </ul>

## Avian Inventory & Monitoring Protocols Passerines

(Note: One reference may be listed under multiple categories, however it is only assigned one reference number, the first time it is listed)

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